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Inspection and Maintenance of Distribution Lines

ORIGINAL

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FOREWORD

This bulletin suggests a systematic program of inspection, records and follow-up to give reliable information on the condition of electric lines and maintenance that is needed. Experience has shown that such information leads to orderly planning, good maintenance and lower costs of maintenance and replacements.

Every cooperative should have a systematic, complete line inspection program including records like those described in this bulletin. If you do not have such a program, we urge you to give this immediate attention with the objective of inspecting at least ten percent of the lines the first year. The amounts inspected in subsequent years may be either more or less depending on findings during the first inspection.

In reporting results, we would suggest that a summary of line inspection progress, inspection results and maintenance progress be included in regular reports of the manager to the board of directors.

This type of program is a preferred source of information for the System Operation and Maintenance Review and Evaluation as prescribed in REA Bulletin 161-5.

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration

April 29, 1975
Supersedes 12/4/52

REA BULLETIN 161-3

SUBJECT: Inspection and Maintenance of Distribution Lines

I. Purpose:

The purpose of this bulletin is to suggest procedures for
(1) recording information about the condition of electric distribution lines during inspections and from other sources;
(2) taking action to maintain satisfactory conditions; and
(3) maintaining controls to assure that needed maintenance work is being done.

II. General:

Everyone is in favor of good maintenance, but how can it be accomplished?

The quality of electric system maintenance is probably the severest test that there is of good management. Effective maintenance requires (1) a clear commitment that the work will be done, and this includes budgeting of funds and manpower; (2) assigning qualified people and making their time available for systematic inspections; (3) finding time to get the work done; and (4) establishing a continuing record and effective controls so that maintenance needs and work progress will be known at all times.

A continuing inspection and maintenance record such as described in this bulletin is regarded as essential for keeping people informed about conditions on the system and about maintenance progress.

III. Why Have Systematic Inspections and Records?

Proper inspection and maintenance records reveal the condition of lines and equipment -- whether the amount of maintenance is adequate, which things (and how many) need attention, and exactly how much work is called for and where. Objectives are:

1. Safety for workers and the public.
2. Better service to consumers.
3. Lower costs, due to improved efficiency in planning and work scheduling. Also, maintaining some items may avoid very costly replacements later.

4. Protection of the large investment in distribution plant.
5. Satisfaction and pride in good workmanship.

Substantial reductions in maintenance costs have been found to occur with systematic inspections and work scheduling, compared with the poorly-planned maintenance that is likely to follow unscheduled inspections.

IV. Procedures:

A. Establishes Policies:

An effective program of inspection and maintenance, where there is one, is the result of a conscious decision that systematic inspections will be budgeted and that progress will be regularly reviewed. The policy decisions or statements needed for initiating such a program may be listed as follows:

1. Decision as to the necessity for a line inspection and maintenance program.
2. Budgeting of dollar costs and manpower for (a) the inspection program and related records, and (b) increased maintenance, if found necessary.
3. Decision whether to contract for the inspections or to have them done by an employee or employees.
4. Requirements for reports or other basis for evaluating results.

B. Select and Train Inspector(s):

Select and train the person or persons to do the inspecting. Qualifications should include:

1. Competence and fairness that will be respected by others who should use the inspection reports.
2. Familiarity with REA construction standards, the National Electrical Safety Code and other applicable codes.
3. Training in inspection of timber products, if responsibilities are to include pole and crossarm inspection.

4. Training and experience in recognizing deficiencies which could create hazards or cause service interruptions.
5. Familiarity with inspection forms and their use.

C. Select Line Sections to be Inspected:

Line sections should be inspected on a rotating basis so that all line will be included during a complete inspection cycle.

If a new program is being started, the sections to be inspected may be selected so that results will portray overall conditions throughout the system. This may be done by listing characteristics that appear important along with line mileage as shown in Table 1.

Table 1. Selection of Representative Line Sections for Inspection

<u>Age of Line and Terrain</u>	<u>Total Amount (Miles)</u>	<u>Amount to Inspect (Miles)</u>
Oldest sections - 25 years or more		
Upland area	300	100
Valley and delta area	50	15
Ages 18 to 25 years (mostly upland)	400	100
Acquisition in 1962 (details not known)	200	50
Ages 10 to 18 years	900	200
Less than 10 years old	600	0
Totals	2450	465

For economical inspections, in the longer term, it may be preferable to inspect on an area basis without attempting to select representative line sections.

Pole inspections that include digging and groundline treatment may be on a different schedule from other inspections. For guidance regarding pole inspections, see REA Bulletin 161-4.

D. Inspection and Recording:

A method of recording data is explained on the back of the sample form attached to this bulletin. The form is designed to be usable for at least five inspections and then retained as a record of conditions found and the work done.

E. Indexing of Inspection Sheets:

Inspection sheets should be numbered and the locations shown on a map for future reference. One method of doing this is illustrated in Figures 1 and 2.

F. Maintenance Log:

Completed record sheets should be filed for ready reference as the inspection proceeds. This may be done in file folders or post-type binders so that sheets can be readily inserted or removed.

The file should be arranged for convenient reference. One convenient way to file is according to detail map number, with sheets numbered in the sequence of inspection. The suggested record form is designed as a permanent record for recording the completion of the needed maintenance. By using codes as shown on the reverse of the form, it can be used for recording results of as many as five inspections.

G. Summaries of Results:

Summaries made from the inspection sheets are helpful for understanding the extent and possible causes of deficiencies as well as for cost and workload determinations. The following are examples of summaries that might be used:

1. Numbers of poles inspected and numbers rejected, for particular brand years, species and treating companies.
2. Numbers of particular kinds of deficiencies observed in particular service areas or substation areas.

H. Maintaining Records and Controls:

To assure that work is done, work orders or other orders for work should be routinely prepared immediately after the inspection, on the same day if possible. Follow-up procedures should assure that the work is completed and appropriate **notations** made on the inspection form. Examples are given in Figures 3 and 4 on the last pages

of this bulletin. These procedures should not rule out on-the-spot corrective steps, but of course the work that is done should be posted on the inspection sheet. For example, a loose ground wire might be reconnected at the time of the inspection and so indicated on the inspection sheet.

Accurate reporting on time sheets is very important. This allows the accounting department to accurately record unit **man-hour** dollar cost figures. Sub-account numbers should be assigned for important categories of work, to improve the value of cost records for controlling costs and estimating man-hour requirements in planning and work scheduling.

V. Reporting:

A. Suggested Reports:

Benefits from the inspection program can be increased through the uses of inspection summaries and reports. Items to include are:

1. The numbers and kinds of deficiencies that would represent hazards calling for immediate correction. Examples are inadequate clearances, damaged conductors or insulators, dangerously weakened poles and certain kinds of attachments or interfering foreign structures.
2. The backlog of replacement and maintenance work, for use in scheduling work and judging manpower needs. Does the backlog indicate that work is being completed at an adequate rate? On the other hand, is the work backlog large enough to permit efficient scheduling?
3. Unit costs of maintenance, replacements and construction (from time reports and the regular accounting procedure) expressed in man-hours. Such data are helpful in estimating manpower needs and in deciding about contracting particular kinds of work. If unit costs appear to be high, what are the reasons?

B. Who Should Receive Reports?

In distributing reports, be sure to consider all who might benefit:

1. The inspection sheets and detailed summaries of results will have their greatest use by key people in management,

operations and engineering. However, some of the results will be of interest to all employees who have a part in planning and performing the work.

2. Each regular monthly report of the Manager to the Board of Directors should include summaries of (1) the results of routine inspections, and (2) progress of maintenance work in comparison with plans or budgets.

Samuel H. Askegaard

Assistant Administrator - Electric

Index:

RECORDS:

Line Inspection and Maintenance, Distribution Lines

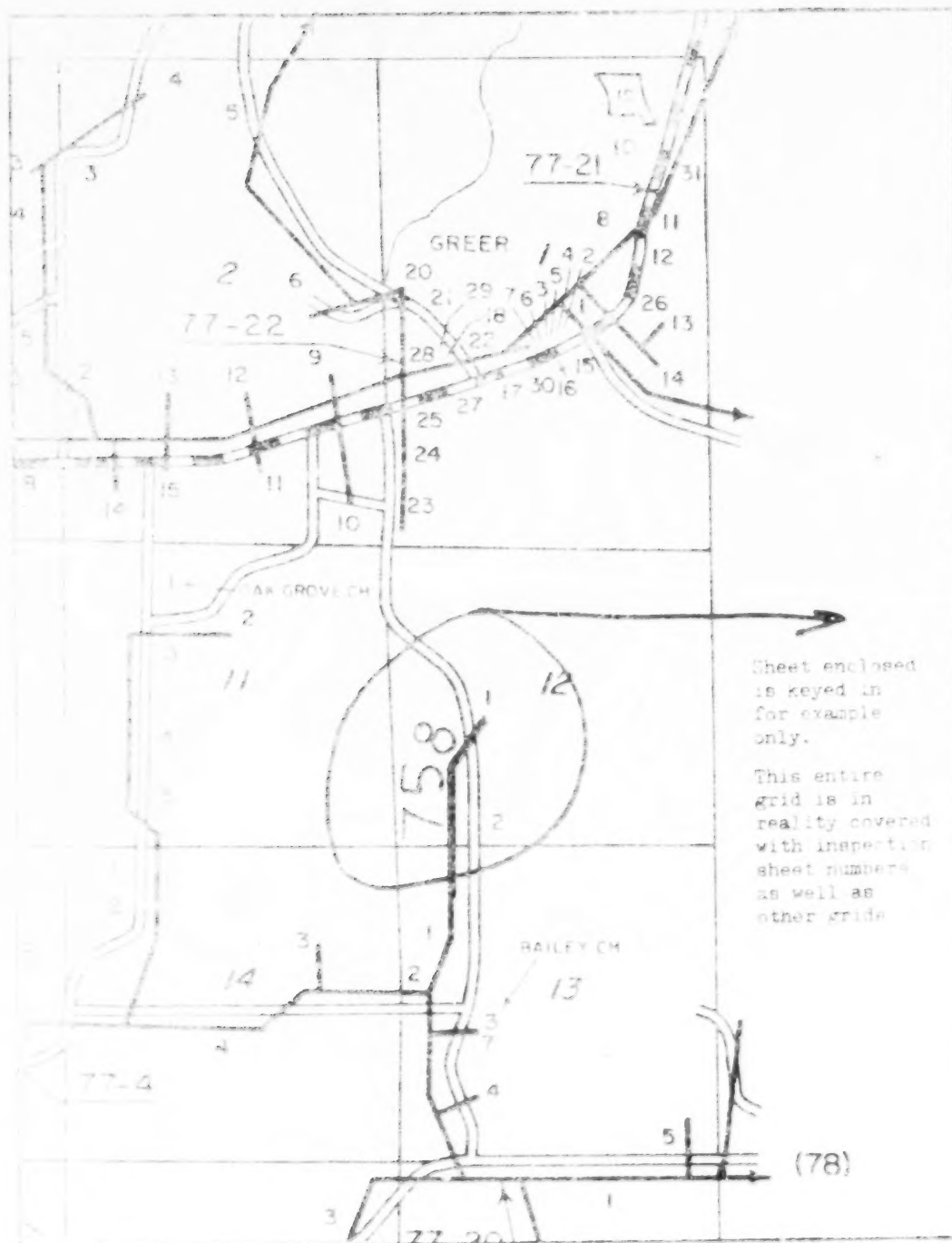
INSPECTION:

Distribution Line

Figure 1. Completed Pole Line Inspection and Maintenance Log Sheet No. 758. (Data furnished by Howell-Oregon Electric Cooperative, Inc., West Plains, Missouri.)

LINE INSPECTION AND MAINTENANCE LOG SHEET															MAP NO.	SHEET NO.
POLE OR STATION NO.	POLE	OVERHEAD										UNDERGROUND			REMARKS	
		WIRE TYPE	WIRE SIZE	WIRE COLOR	WIRE TENSION	WIRE SAG	WIRE CLEARANCE	WIRE CONDITION	WIRE ATTACHMENT	WIRE SUPPORT	WIRE PROTECTION	WIRE CLEARANCE	WIRE CONDITION	WIRE ATTACHMENT		WIRE SUPPORT
77-12-2	15															
77-12-2	25															
77-12-2	35															
77-12-2	45															
77-12-2	55															
77-12-2	65															
77-12-2	75															
77-12-2	85															
77-12-2	95															
77-12-2	105															
77-12-2	115															
77-12-2	125															
77-12-2	135															
77-12-2	145															
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77-12-2	935															
77-12-2	945															
77-12-2	955															
77-12-2	965															
77-12-2	975															
77-12-2	985															
77-12-2	995															
77-12-2	1005															

Figure 1. Map Location of Mine Inspected, Sheet 7.8.



MAINTENANCE ORDER
Trouble Call

NAME: _____ Address: _____
Location: 77-12-1 5-S Date: 5-27-68 Received by: EVINS

Released: _____

For: _____

Trouble:

REPLACE PIN TYPE
INSULATOR

INSPECTION SHEET # 758

Results or Remarks:

When work is completed,
form will be signed, dated
and turned in for recording on
inspection sheet #758.

Date: _____

Signed: _____

Figure 3. Maintenance Order Resulting from Line Inspection. (Sample furnished by Howell-Oregon Electric Cooperative, Inc., West Plains, Missouri. These and staking sheets are completed before inspection sheet is filed.)

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Figure 4. Staking Sheet for Work Resulting from Pole Line Inspection.

15540 R
15540 A

STAKING SHEET

System Design: Alton

Location: ALTON

Top: R

Map Reference: 77-13-2 3E

Work Order No. 15540 R

Sheet No. 1 of 1

Line: _____ Lead: _____

ENGINEER: EVINS

Staked: 5-27-68

Checked: _____

Released for: _____

SKETCH OF WORK

POLE NO.	SPAN FT.	INS. K.S.	P.B. INT.	WIRE SIZE	LINE TYPE	OR F.M.2	KIND E	AN CHOR	SECONDARY SPAN	UNIT NO.	SERVICE SPAN	SEC. UNIT	SPR. WIDE	METER LOOP	MISC. & REMARKS
EXISTING POLE		306	A-1				22								
REMOVE POLE		306	A-1				22								77-13-2 3E
ADD POLE		306	A-1				22								REAL Bld

This form plus material is turned in for recording when work is completed

INSPECTION SHEET # 758

Acct.	360				364				365				368				369				370										
	Wired	Unwired	30 & Under	40 & 45	30 & Over	Anchor Guy Assembly	Crossarm	Grounds	Insulation	Strings	Arrestors	Clamps	RTWP	STWP	8' CW	8' MC	Arrestor	Clamp	Tray	Conduit	Meter Loop	2 1/2 W.P.	Service	3 1/2 W.	Service	3 1/2 W.	Service	Misc.	Series	Meters	Members
Add	/							/																							
Retire	/							/																							

LINE INSPECTION AND TAG SHEET - INSTRUCTIONS

This sheet is designed to provide a permanent record of distribution pole line inspection and maintenance as concerns work accomplished, as well as work to be done. It is intended for use in the field to record the results of line inspection and then as an office record. It should have value for such purposes for many years after the original inspection has been recorded.

APPLICATION

Record all poles so that the same sheets may be used for subsequent inspections.

To record a maintenance item to be done, mark the appropriate block thus



When the work is completed, mark the same block thus



To record the same item in a subsequent year, mark the same block thus:

2nd Year.....



3rd Year.....



4th Year.....



5th Year.....



If it is necessary to make a note concerning a listed item, mark thus



Then enter the comment in the column marked "NOTES".

A thin lead pencil should be used and colors may be employed if desired to differentiate between subsequent inspections. The sheet is ruled on the back for additional "REMARKS AND NOTES" and may be folded so that the lines coincide with the pole numbers on the front.

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